

# PATENT COOPERATION TREATY



## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

BEST AVAILABLE COPY

Applicant's or agent's file reference ...		<b>FOR FURTHER ACTION</b>		See Form PCT/IPEA/416
International application No. PCT/GB2004/002620		International filing date (day/month/year) 18.06.2004	Priority date (day/month/year) 23.06.2003	
International Patent Classification (IPC) or national classification and IPC A61B18/18				
Applicant MICROSULIS LIMITED ET AL.				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 7 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 3 sheets, as follows:</p> <p style="margin-left: 40px;"><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input checked="" type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand  24.01.2005		Date of completion of this report  21.07.2005		
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer  Petter, E  Telephone No. +31 70 340-2866 		

INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITYInternational application No.  
PCT/GB2004/002620

IAP20 Rec'd PCT/PTO 22 DEC 2005

**Box No. I Basis of the report**

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

**Description, Pages**

1-6 as originally filed

**Claims, Numbers**

1-13 as amended (together with any statement) under Art. 19 PCT

**Drawings, Sheets**

1/2, 2/2 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/GB2004/002620

---

**Box No. IV Lack of unity of invention**

---

1. ☐ In response to the invitation to restrict or pay additional fees, the applicant has:
- ☐ restricted the claims.
  - ☐ paid additional fees.
  - ☐ paid additional fees under protest.
  - ☐ neither restricted nor paid additional fees.
2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is
- ☐ complied with.
  - ☒ not complied with for the following reasons:  
**see separate sheet**
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☒ all parts.
  - ☐ the parts relating to claims Nos. .

---

**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

---

1. Statement

Novelty (N)	Yes: Claims	1-12
	No: Claims	13
Inventive step (IS)	Yes: Claims	1-12
	No: Claims	13
Industrial applicability (IA)	Yes: Claims	1-13
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)**

International application No.

PCT/GB2004/002620

**Re Item IV.**

Independent claims 1 and 8 do not provide a single inventive concept in the sense of Rule 13.1 PCT. The **special technical features** of those claims - regarded as the **difference** between the subject matter of those claims and the closest prior art D1 (see points V.2 and V.3 below) - are different and not corresponding because they relate to different objective problems to be solved (see also points V.2 and V.3 below).

Therefore, there is no technical relationship involving one or more of the same or corresponding special technical features in the sense of Rule 13.2 PCT between the inventions as defined in claims 1 and 8. Hence, there is no unity of invention as required by Rule 13.1 PCT.

Note that since independent claim 13 is not considered to define any feature different from D1 (see point V.4 below), it also does not have a special technical feature in the sense of Rule 13.2 PCT.

**Re Item V.**

1 The following documents are referred to in this communication:

D1 : US 6 134 476 A (ARNDT ET AL) 17 October 2000 (2000-10-17)

D2: WO 00/49957 A (MICROSULIS PLC ; NIGEL CRONIN (GB)) 31 August 2000  
(2000-08-31)

D3 : US 6 287 302 B1 (BERUBE DANY) 11 September 2001 (2001-09-11)

2 INDEPENDENT CLAIM 1

Document D1, which is considered the closest prior art with respect to the subject matter of claim 1, discloses in figure 7 (the references in parenthesis applying to this document):

A radiation applicator (700) having a power input at one end, an elongate antenna (antenna pole 702) extending axially of the applicator at its distal end, and a dielectric

body (708) which surrounds the antenna (702), the radiator serving to emit radiation radially of the antenna into surrounding material.

From this, the subject-matter of independent claim 1 differs in that: *the dielectric body consists of multiple sections of different dielectric constant which are located axially relative to one another along the antenna*. The subject-matter of claim 1 is therefore novel (Article 33(2) PCT).

The problem solved by this feature is to provide an alternative way of matching or tuning the antenna and thereby optimizing power transfer.

Although document D3 discloses (see figure 4 and column 8, line 64 - column 9, line 35) an antenna having a dielectric body consisting of multiple sections of different dielectric constant (26, 30, 22=37 in figure 4), the construction of this antenna is so different from that of D1 that there appears no obvious way to combine their teachings. Therefore, the subject matter of claim 1 is considered to involve an inventive step (Article 33(3) PCT).

Claims 2-7, 9-12 are (in part) dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

### 3 INDEPENDENT CLAIM 8

Document D1 discloses in figure 7 (the references in parenthesis applying to this document):

A radiation applicator (700) having a power input at one end, an elongate antenna (antenna pole 702) extending axially at its distal end for emitting radiation into surrounding material, and a dielectric body (708) which surrounds the antenna (702), whereby one or more radiation reflectors (712, 714) are located axially along the antenna within the dielectric body to modulate the transmission of radiation (see column 12, lines 28-44). Furthermore, said two radiation reflectors (712, 714) are spaced apart with the intermediate section of the dielectric body (intended to) emitting radiation radially into the surrounding material (see column 12, lines 28-24: "the discontinuities can be considered microwave sources" and hence, at least some

radiation is radially emitted through the intermediate section of the dielectric material between the two reflectors).

From this, the subject-matter of independent claim 1 differs in that: *the reflector on one side further from the input having a larger area so as to reflect more radiation than the reflector nearer the input end, thereby reducing transmission of radiation through the tip of the applicator.*

The problem solved by this feature - as already indicated in claim 8 - is to reduce transmission of radiation to the tip of the applicator. Neither the feature nor the problem is disclosed in D1 so that the subject matter of claim 8 meets the requirements of Article 33 PCT with respect to novelty and inventive step.

Claims 9-12 are (in part) dependent on claim 8 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

#### 4 INDEPENDENT CLAIM 13

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 13 is not new in the sense of Article 33(2) PCT.

Document D1 discloses in figure 7 (the references in parenthesis applying to this document):

A radiation applicator (700) having a power input at one end, an elongate antenna (antenna pole 702) extending axially at its distal end for emitting radiation into surrounding material, and a dielectric body (708) which surrounds that antenna (702), whereby the antenna (702) extends through a hole in a section of said dielectric and through a hole in a radiation reflector (712, 714) attached to an axial end face of said section of dielectric body, and said radiation reflector is attached to said antenna (see column 12, line 20: "physically connected directly to antenna pole 702") thereby giving structural support to the applicator.

Therefore, D1 discloses all the features of claim 13.

**INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)**

International application No.

PCT/GB2004/002620

Note that the reflectors (712, 714) split the dielectric body (708) into **sections** and therefore the reflectors can be considered "attached" to axial end faces of such sections. It is also clear that, since the reflectors in D1 are disk-shaped, they have a **hole** in the middle.

10/561701

7  
CLAIMS

IAP20 Res. d. 22 DEC 2005

1. A radiation applicator has a power input at one end, an elongate antenna extending axially of the applicator at its distal end, and a dielectric body which surrounds the antenna, the radiator serving to emit radiation radially of the antenna into surrounding material, characterised in that the dielectric body consists of multiple sections of different dielectric constant which are located axially relative to one another along the antenna.
2. An applicator as claimed in claim 1 in which, the dielectric body consists of a second section adapted to emit radiation, and a first section between the second section and the power input, and having a lower dielectric constant than the first section.
3. An applicator as claimed in claim 2 in which the dielectric body has an outer section furthest from the power input having a dielectric constant lower than that of the second section.
4. An applicator as claimed in claim 3 in which the outer section has a dielectric constant intermediate that of the first and second sections.
5. An applicator as claimed in any of claims 1 to 4 in which, the multiple sections are made as separate components and are assembled to abut against one another end-to-end.
6. An applicator as claimed in any of claims 1 to 5 in which, a radiation reflector is provided at the interface between two sections of the dielectric body so as to modulate the transmission of radiation and tune the applicator.

EPO - DG 1

11.02.2005

(99)



7. An applicator as claimed in claim 6 in which, a radiation reflector is provided each side of a section which is intended to emit radiation into the surrounding material, a reflector on that side further from the input end having a larger area so as to reflect more energy than the reflector nearer the input end, thereby reducing transmission of radiation to the tip of the applicator.
8. A radiation applicator having a power input at one end, an elongate antenna extending axially at its distal end for emitting radiation into surrounding material, a dielectric body which surrounds the antenna, and one or more radiation reflectors located axially along the antenna within the dielectric body to modulate the transmission of radiation, characterised in that two radiation reflectors are spaced apart with the intermediate section of the dielectric body intended to emit radiation radially into the surrounding material, the reflector on one side further from the input having a larger area so as to reflect more radiation than the reflector nearer the input end, thereby reducing transmission of radiation to the tip of the applicator.
9. An applicator as claimed in any one of claims 6 to 8 in which, each reflector is located at the interface between separate sections of the dielectric body and gives structural support to the applicator.
10. An applicator as claimed in any one of the preceding claims in which the outer end of the dielectric body furthest from the power input is pointed.
11. An applicator as claimed in any one of the preceding claims in which the power input comprises a coaxial conductor in which the central conductor extends from the outer conductor to form said elongate antenna.
12. An applicator as claimed in claim 11 in which the dielectric body has a reduced diameter and which is inserted into the open end of the outer conductor.

13. A radiation applicator having a power input at one end, an elongate antenna extending axially at its distal end for emitting radiation into surrounding material, and a dielectric body which surrounds that antenna, characterised in that the antenna extends through a hole in a section of said dielectric and through a hole in a radiation reflector attached to an axial end face of said section of dielectric body, and said radiation reflector is attached to the antenna so as to give structural support to the applicator.

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☒ FADED TEXT OR DRAWING
- ☒ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☒ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☒ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**